



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. 21.

Lancaster, Pa., January 25, 1894.

No. 1.

Contributions to American Bryology, IV.

NOTES ON THE NORTH AMERICAN SPECIES OF
ORTHOTRICHUM—II.

B. Those with immersed stomata.

ORTHOTRICHUM STRANGULATUM Beauv. Prod. 81 (1805). As the "Prodrome des cinquième et sixième familles de L'Æthéogamic, les Mousses, les Lycopodes par A. M. F. J. Palisot-Beauvois," is a rare book and not likely to be consulted by many to verify my statements, I quote the original description in full, especially as the specimens in Schwægrichen's herbarium supposed to be authentic do not agree with the original description :

Orth. strangulatum; caule erecto diviso; foliis lanceolatis, costa integra notat is; pyxidibus subimmers is, suborificio strangulatis; calyptra fusca, brevi, cupulæformi.

Cette espèce m'a été envoyée de l'Amérique septentrionale, par le docteur Mühlenberg. Elle ressemble, par ses feuilles à l'*Orth. commune (anomalum)*; par sa coiffe à l'*Orth. cupulatum*; ses tiges sont plus petites que celles de la première, et toutes ses parties, en général, plus grosses que dans les secondes; mais elle se distingue complètement par son urne, qui, dans la sécheresse, au-dessus de l'espèce d'anneau qui supporte les dents, est resserrée et étranglée, ce qui lui donne un peu le port de l'urne des *Splachnum*.

Now the description of the capsules seems to refer to the species to which Sullivant applied the name (Sull. Icon. 57, t. 36 (1864) a tree species, with double peristome, the teeth united in pairs, and eight cilia, quite distinct from the species which Schwægrichen figured and described in his Supplement (1: ii. 33, t. 54

(1816), as any one may see by comparing the figures, and which I have verified by seeing his specimens from the Boissier Herbarium. Not only are the capsules not strangulate, but they belong to the other section of the group of those with immersed stomata, to the rock species to which Beauvois compared them, those with a simple peristome, without cilia, teeth single, striolate, and erect when dry. It seems probable, then, that the types of *O. strangulatum* are not the specimens in the Boissier Herbarium, but must be looked for in the Delessert Herbarium, where I understand that Palisot de Beauvois' specimens are preserved.

ORTHOTRICHUM STRANGULATUM Schwægr. Suppl. 1: ii. 33, *t.* 54 (1816).

The specimens used by Schwægrichen to figure for his Supplement were received by me from the Boissier Herbarium, November 24, 1893. The label reads *Orthotrichum strangulatum*, Muhlbg. b. b. a Palisot s. n.

The specimens are abundant and in fine condition. The two upper ones on the right are marked b. b., and are the ones referred to in the label as having been sent to him by Palisot de Beauvois. In two little packets are preserved the peristome, bracts and leaves which were used in making the drawings for *t.* 54, and are correctly represented in the figures, excepting that the teeth are drawn with too many joints, the originals having only 6–8 segments, the three upper being longer than broad, papillose and striolate. In one capsule, from which the lid had just fallen, the teeth were united by a hyaline membrane, forming rudimentary cilia. The teeth are set deep, with an annulus of two rows of thin cells projecting above the rim of the capsule, which is also bordered by three or four rows of darker brown and denser cells. The preperistome, if present, is very difficult to see, though I did not care to examine but one capsule in searching for it. The ridges are broad, of 4–5 rows of cells, with broad spaces between them, and occasionally traces of narrower ridges with colored cells between them. The stomata are immersed, in two rows between the base of the spore-sac and the mouth, they are closed.

The leaves are 2–3 mm. long, the perichaetial the longer, with a prominent vein ending below the apex, the upper cells large,

hexagonal, the lower oblong with large, brown auricles at the basal angles, which, however, are difficult to see, as they tear off in dissecting. The margins are revolute and the cells papillose.

All the other characters of the species are correctly represented on table LIV., the short stems, 5–10 mm. high, with brown tomentum at base, the leaves densely crowded above, the capsules immersed, with only the red bordered lid projecting above them, the hairy calyptra, and the cylindric capsule, 1.5 mm. long, the neck, .5 mm. There are no old empty capsules on these specimens, so that none are strangulate, but one or two are contracted below the mouth when dry.

Even before seeing the specimens I became convinced that the species figured in t. LIV. was the same *O. Porteri*, Austin. The type localities are the same, Lancaster, Pennsylvania. I have compared them macroscopically and microscopically and cannot find any difference between them.

I have also learned through the kindness of Dr. Farlow that Sullivant's copy of Schwægrichen's supplement is annotated as follows:

"LIV. This may be a small form of *O. cupulatum* and probably is what I have in Austin's Musci Appal. called *O. Porteri*. It is clearly not what has long passed among us as *O. strangulatum*. Both Hooker and Wilson have referred to this plate as belonging to *cupulatum*. Bridel, however, thinks differently."

The only reason for doubting whether *O. strangulatum* Beauv. is the same as Schwægrichen figured is the strangulate half-exserted capsule, as it will be seen that none of the other differences are mentioned by Beauvois. It is not impossible that *O. strangulatum*, Beauv., should be *O. Porteri* Aust., for the capsules of the latter are strangulate when old, though less so than *O. strangulatum*, Sull., but as the original description is so emphatic, and the specimens sent to Schwægrichen are none of them strangulate, it seems probable that eleven years after his description was published he might have made a mistake, and sent him a different species. Should it be proven that the specimens in the herbarium of P. de Beauvois agree with those he sent to Schwægrichen as *O. strangulatum*, then this name would have to stand for *O. Porteri* Austin, but in view of the fact that the original description calls for a strangulate capsule, and none of the specimens are strangu-

late, we must maintain this name in the sense in which Sullivant and all subsequent authors have used it. Bridel was the first to apply it to the tree species definitely, for in the *Bryologia Universalis* (1: 273, 1826) he says, of the habitat of this species:

"In America boreali, arborem, ut e speciminibus a D. Torrey Noveboraco missis corticique adnatis video, nec terrigenum caespitose habitat."

The "nec terrigenum" refers to the habitat given by Schwægrichen in his supplement, where he says, "probabiliter rupestre aut terrigenum." But he cites Schwægrichen's description almost word for word, describing the teeth as sixteen, whereas if the specimens sent him by Dr. Torrey were from trees they must have had eight teeth united in pairs. This does not affect the question of the name, however, though I have sent specimens of *O. strangulatum* Sull. (Beauv. ?) and *O. Porteri* to Berlin for comparison with Bridel's specimens.

Braithwaite (*Brit. Mosses*, 2: 77) cites *O. strangulatum* Beauv. as one of the synonyms of *O. cupulatum* Hoffm. and quotes Schwægrichen's Supplement t. LIV. also for this species. Now it seems to me that tables LIV. and LV. disprove this, for certainly the true differences between *O. cupulatum* Hoffm. and *O. strangulatum* Schwæg. are clearly figured in these two plates and show that as early as 1816 the specific value of *O. Porteri* was recognized, even though all later authors have referred it to *O. cupulatum* as a variety.

ORTHOTRICHUM STELLATUM Brid. *Bryol. Univ.* 1: 274 (1826).

Since Renauld and Cardot have listed this name in their catalogue of mosses of North America as No. 552, and it has been omitted from all our text-books, it seems of interest to look into the matter, especially as Bridel says:

"*O. strangulato* proximum, et foliis supremis stellatis, ut et peristomii structura et calyptra glaberrima ab eo distinctum.

"Species propria esse videtur.

"In Massachusetts Americae Septentrionalis ad arbores habitat. D. Torrey Noveboraco misit."

I have not been able to find any specimens in Dr. Torrey's herbarium labelled *O. stellatum*, nor *O. strangulatum*, but it seems to me the explanation is this: Dr. Torrey sent him the tree species labelled *O. strangulatum*, which on comparison with the descrip-

tion and plate of Schwægrichen's supplement, he saw had 8 teeth, united in pairs, and a calyptra free from hairs, so he called it *O. stellatum*, but described it with a simple peristome. As the cilia are often lacking in old capsules this would be easily explained. It will be seen that his description of *O. strangulatum* called for 16 teeth and a hairy calyptra.

In the Jaeger Herbarium I find an autograph specimen from Müller, collected by T. Boll at Cambridge, Mass., labelled *O. strangulatum*, var. *stellatum*, Brid. These specimens were examined and prove to be like *O. strangulatum* Sull. in every particular except the absence of cilia. The capsules are old and urceolate, and the calyptras are without hairs.

Of course, if it were proven that *O. stellatum* Brid. antedates *O. strangulatum* Sull. it would also antedate *O. Braunii* Br. & Sch. by eleven years, for according to Dr. Venturi (Musc. Gall. 182, 1887) "*L'O. strangulatum* Sull. de l'Amerique du Nord, publié par M. Austin, dans le Musci Appalachiani y correspond parfaitement, de sorte que je ne doute pas de son identité avec l'*O. Braunii*."

I have sent specimens to Berlin and asked Dr. Paul Hennings to compare Bridel's *O. stellatum* with Boll's specimens and with *O. Porteri*, as well as *O. strangulatum* Sull.

Müller in the Synopsis Muscorum 1: 702 cites *O. strangulatum* with Schwægrichen's description and Bridel's habitat "In arboribus Muhlenberg primus legit." He cites *O. stellatum* Brid. as a synonym.

Venturi in the Muscologia Gallica (part vi. 171, 1887) says that *O. stellatum* Brid. communicated by Schrader, from North America, is allied to *O. fastigiatum*, and not to *O. strangulatum* Sull., where it has been referred, but that the specimens are too imperfect to be properly recognized. This would seem to indicate that he had seen the type. At any rate as *O. strangulatum* Sull. is a very common species in the Eastern States, and *O. fastigiatum* has only been collected in two localities around Lake Superior as far as we now know, therefore it seems most likely that the alliance indicated by Bridel himself is the correct one. The examination of the stomata alone would determine this, and they may be seen on any old capsules, for *O. fastigiatum* has superficial stomata and *O. strangulatum* Sull. has immersed.

Dr. Venturi says in a recent letter :

"Apropos of the confusion in nomenclature, it is sufficient to note that *O. strangulatum*, which originally was of the group of *Orth. cupulatum*, is in Lesq. and James' Manual identical with *O. Braunii*. In Austin's Musci Appalachiani I am certain that the specimens distributed as *O. strangulatum* are precisely *O. Braunii*, which should maintain its name, though more recent, because the original *O. strangulatum* of P. de Beauvois is a confused species."

As we have already shown, it is not proven that the original specimen of P. de Beauvois did belong to the group of *O. cupulatum*. That the plants figured by Schwægrichen are *O. Porteri*, there can be no doubt, but the original description throws a doubt on these specimens. We admit that *O. Braunii* would antedate *O. strangulatum* Sull. by nineteen years, but *O. strangulatum* Beauv. if proven to be the same would antedate them both. That it can be proven seems more than probable, and as the herbarium of Palisot de Beauvois is preserved in the Delessert Herbarium at Geneva, I have sent specimens of both species to which the name has been applied, and asked to have them compared with the original specimens sent to Beauvois by Muhlenberg. I have also asked M. Eugene Autran to compare the specimen from the Boissier Herbarium figured by Schwægrichen with the originals.

ORTHOTRICHUM STRANGULATUM, var. Sull. Icon. Suppl. 65, t. 47 (1874).

This variety is not referred to in the Manual. It is described by Sullivant as smaller and more rigid than the normal form, the leaves shorter and acute, the margin revolute almost to the apex, capsule oval, broader and less strangulate when dry, sub-exserted, on a long pedicel.

Hab. on trees, Put-in-Bay, Lake Erie.

ORTHOTRICHUM CUPULATUM Hoffm. Deutsch. Fl. 2: 26 (1796).

This species seems to be more rare in North America than has been supposed. After separating out *O. Porteri* and *O. Lescurii* Austin, placing Drummond's No. 152 under *O. nudum*, though the calyptras are lacking in our specimens, and splitting up No. 176 of S. & L. Musci Bor. Am. Ed. 2 into *O. nudum* and *O. Porteri*, there remain only three specimens in our herbarium which agree with *O. cupulatum*. Leiberg's from calcareous ledges around Lake Pend d'Oreille, Idaho, which agree exactly with

Limpricht's Bryotheca Silaesiaca No. 366 cited in his Laubmoose. Macoun's specimens from Arrow Lake, B. C., cited in his Catalogue as *O. nudum* var. *Rudolphianum* are also *O. cupulatum*; and Thos. Howell's collected in Oregon. Macoun's catalogue notes localities in British Columbia and Baffin's Bay. This would seem to indicate a Northern and Western range for *O. cupulatum* and throw it out of our Eastern Handbooks, therefore it is very desirable that more specimens should be collected of this species in order to determine whether it occurs within our limits.

O. SCHIMPERI Hammar, Mon. Orth. Suec. 9 (1852).

O. pumilum Dicks. Pl. Crypt. fasc. 4, 5 (1801) non Sw. (1799).

O. fallax Schimp. Syn. 264 (1860) L. & J. Man, 171 (1884).

Any one who has studied the minute descriptions of Limpricht's Laubmoose, and read Philibert's article on *O. Schimperii* and its allied forms (Rev. Bryol. 33, 1891) will realize that much more study must be given to North American specimens before we can be satisfied that we understand this species and its alliances. The group includes, besides what we have been calling *O. fallax* Sch. *O. strangulatum* (Beauv.?) Sull. *O. Canadense* Br. & Sch. *O. brachytrichum* Sch. and two varieties, *O. strangulatum* var. Sull. and *O. fallax* var. *truncatulum* Aust.

The specimens which Philibert recognizes as typical *O. Schimperii* have a smooth calyptra. American specimens have a few short hairs. Specimens distributed as *O. fallax* Sch. by Limpricht as 129b Bryotheca Silesiaca and Rabenhorst's 125b Bryotheca Europea agree with Philibert's statement that the stomata may be both open and closed on the same capsule. No American specimens that I have seen have the stomata wide open, as described by Limpricht in the Laubmoose. Our specimens also differ somewhat in the color and size of the plants, the shape of the capsule when dry, being less urceolate than European specimens, and the ridges less sharply differentiated and less highly colored, and in the size of the spores! But as they agree in all the main characters, including the very papillose teeth, and especially in the leaves, it seems a refinement of species to separate them. However, it is possible that the American specimens are another species, which

has not been collected since it was described: *Orthotrichum brachytrichum* Sch.

ORTHOTRICHUM BRACHYTRICHUM, Schimp. Proc. Am. Acad. 14: 140 (1879).

It is always well to distrust a species which has only been collected once, and to seek for the nearest allied species for which it may have been mistaken. After seeing the type of *O. brachytrichum* from Kew, and comparing it with *O. obtusifolium*, with which it had been confounded, I discovered that it belonged to the section with immersed stomata, between *O. Schimperii* and *O. strangulatum*, where it is placed in the Manual. It is so near the former that I am inclined to think they are the same species. The leaves agree in every way, not only in the specimens, but in the descriptions, and so do all the essential characters of the capsules, except that in the types of *O. brachytrichum* is perhaps a trifle longer, with a more tapering neck. The calyptra, as the name implies, has a few short hairs. The ridges of the capsules are broad and conspicuous on the mature capsules, alternating with spaces equal to or narrower than the ridges. The cells which compose them are broad yellow, in 2-5 rows, alternating with 5-6 rows of narrower cells, and agree with the figures given by Limpricht of *O. Schimperii*. The stomata are small and quite closed.

It may be that we shall conclude to call all the American specimens by Schimper's name, but I have sent specimens to both Philibert and Venturi to ask for their opinion and a further comparison with European *Schimperii*.

O. FALLAX var. *TRUNCATULUM*, Aust. Bull. Torr. Club, 6: 344 (1879).

Austin lays stress on the leaves being "hyaline apiculate, the capsule cylindric and costate its whole length, abrupt at base with the cilia as long as the teeth." We have examined his type specimens collected in Illinois by Hall at the base of old buildings and find many of the leaves ending in a single clear cell, as figured by Schimper in the *Bryologia Europea* t. 211. The capsules however are slightly longer than in *O. fallax*, the largest 1.5 mm. long with the lid, but the truncate base and short neck is quite characteristic of that species as well as of these specimens, and the seta immersed in and shorter than the ochrea which flares out and

embraces the base of the capsule is also quite typical. The cilia are slender as long as the teeth and slightly appendiculate; but this too is found to agree with Limpricht's description of *O. Schimperii*. The calyptra has a few short hairs at apex, and on the whole the specimens agree perhaps better with *O. brachytrichum* than with European specimens of *O. Schimperii*.

ORTHOTRICHUM CANADENSE Br. & Sch. Lond. Journ. Bot. 2: 667 (1843), non Sullivant's Mosses U. S. 34 (1856).

This species was described from Drummond's North American mosses as follows:

"149-151. *Orthotrichum affine* var. capsulis exsertis, is more nearly related to *O. patens* but differs, however from this species remarkably in its smaller capsules, which are longer pedunculated and in the rusty red-colored teeth of the peristome: it is without doubt a new species, for which we propose the name *O. canadense*. No. 149 differs from 151 only in having longer stems."

We have been favored by the Director of the Royal Botanic Gardens at Kew with the privilege of seeing a portion of the type, which is labeled "*Orthotrichum Canadense* (*O. affine* var.) Ober Canada," and matches Number 151 in our set of Drummond's mosses which is labeled *O. affine* var. capsulis exsertis (an species distincta?), Hab.—Upper Canada, and about Lake Superior; upon trees." It will be seen from the citation of the names and localities that Bruch and Schimper had reference principally to 151, and the characters of the specimens confirm this supposition. They refer to 149 secondarily and seemingly without careful comparison, for our specimens at least are not the same species as 151. The specimens from Kew as well as our 151 are older, and two out of three capsules are without peristome, but the third shows a simple peristome of sixteen striolate teeth, the capsules are exserted and the walls have eight prominent ridges, besides narrower intermediate ones. The stomata are immersed.

I do not know how to account for the intermediate ridges, on a species said to be allied to *O. patens*, for they usually indicate one of the rock species such as *O. anomalum*, but as these capsules are strangulate, smaller, and less exserted than those of that species, and furthermore were said to grow on trees, we must exclude that hypothesis. The separation of the teeth and absence of cilia may be accounted for by age, and indeed Sullivant figures

them separate in the Icones, though I am not certain whether his drawings were made from Drummond's 149 or from Watson's Utah specimens. It is only an inference on my part that the Kew specimens were taken from 151, however. The resemblance of our specimens of 151 to 148 which was distributed as *O. anomalum* is very close, and the specimens are in the same stage of growth, so that it is not impossible that some specimens of the latter may have been mixed with 151 in collecting or distributing.

No. 149 in our set and Prof. Macoun's are another species. They are mature, not in that intermediate stage where the new calyptras are present with old capsules as in 151. They have the lids on in several cases, and the peristome of one of these freshly opened capsules shows the teeth united in pairs, pale white, almost smooth, but with a high magnification (300), the basal part of the teeth is granulose, and the upper segments striolate; they are more or less perforate and divided into three or four parts at apex, and the eight cilia are long and slender, with two rows of cells at base. The ridges are very broad, of 6-8 rows of cells, with very narrow spaces between them, and the stomata are immersed around the base of the spore-sac. The neck tapers into the ochrea, and the seta is short.

ORTHOTRICHUM ALPESTRE var. Sull. Icon. Suppl. 69, t. 51 (1874).

O. alpestre var. *majus* L. & J. Man. 169 (1884).

O. occidentale James, Expl. 40th Parallel, 402 (1871).

Sullivant cited Drummond's No. 149 as this species; also Watson's specimens from Utah. He says of it that it differs from the normal form of *O. alpestre* in its greater size, glaucous green color, broader leaves with more reflexed margins, more elongated papillæ, either simple or bifurcating, and the longer and minutely punctulate teeth. In Limpricht's Laubmoose I find that *O. alpestre* is described as an alpine rock species, with the teeth distinctly striolate and perforate, united to apex, cilia 8 of two rows of cells and appendiculate. Drummond's 149 agrees very well with the description, though the teeth are less distinctly striolate than indicated by Limpricht, but the habitat is according to the label, on trees, not on rocks.

Watson's Utah specimens grew on trees also, as shown by the

original specimens, recently seen in the Sullivant herbarium. The *Icones* cites them as growing on rocks. We sent a portion of 149 to M. Philibert and he says they agree with European specimens of *O. alpestre* in his collection. Specimens collected by R. S. Williams, No. 96 and distributed *O. alpestre* var. *majus*, grew on rocks, in the Belt Mountains, Montana, and were sent to Venturi for comparison. He says they are *O. alpestre*, and the most extreme form he has seen in its differences from *O. stramineum*, to which *O. alpestre* is closely allied.

Noticing that Limpricht cites the locality of this species as on trees and *O. alpestre* on rocks, we tried to refer No. 149 to the former, but we could not find any intermediate cilia.

It will be seen, therefore, that both *O. Canadense* and *O. alpestre*, var. Sull., stand on very uncertain foundations, and require more study to settle the question of their value. *O. Canadense*, especially, based on two numbers of exsiccatae, which are more or less mixed and imperfect, with such a meagre description, can hardly be said to be a well established species. Prof. Macoun's specimens of No. 151 do not show any intermediate ridges and do not agree exactly with the Kew specimens or with 149; the capsules are older than 149, are less strangulate, and the peristome is gone, so that they do not help us to solve the riddle, and only complicate the question of what is *O. Canadense*?

We have received specimens from Prof. Macoun which agree with 149, but he is uncertain whether he collected them on rocks or trees. They are mixed with *Grimmia apocarpa*, but the label says on trees near Ottawa. It will be noted that No. 149 of Drummond's mosses is cited in the Catalogue as No. 338, *O. alpestre*, (p. 88), and again with 151 as No. 361 *O. Canadense* (p. 92). Mr. Wright informs me that there are specimens at Kew, collected by Prof. Macoun on trees along the Moira at Belleville in 1865, labelled *O. Canadense* by Mitten.

ORTHOTRICHUM TENELLUM Bruch, Brid. Bryol. Univ. 1: 786 (1826).

Specimens collected on trees by J. Dearness, near Ottawa, in May, 1889, are credited to this species in Macoun's catalogue (6, 90). I have seen the specimens and compared them critically with European descriptions and exsiccatae. They are not *O.*

tenellum, but agree in every way with what we have been calling *O. strangulatum* (Beauv.?) Sull. We have recently received from S. B. Parish specimens collected in California, which do agree with the descriptions and specimens in all but the cilia, and they are not papillose as Limpricht described them. *O. tenellum* is one of the few species of *Orthotrichum*, which have the stomata in the neck of the capsule and not around or above the base of the sporesac, and hence it is readily recognized.

ORTHOTRICHUM PUMILUM, AMERICANUM Vent. Musc. Gall. 180 (1887).

Orthotrichum pumilum Sw. fide Austin Musci App. 165 (1870).

O. fallax Sw. fide Austin, Bull. Torr. Bot. Club, 6: 344 (1879).

We have examined the specimens in our set of Austin's Musci Appalachiani, and compared his specimens with European specimens of *O. pumilum*. They are not that species, and we have not yet been able to find the specimens that Venturi referred as a variety to *O. pumilum*. The figure given by him indicates that his capsules were much shorter than any European specimens (T. xlix. 15a), and from the following description it would seem as if he had reference to *O. Ohioense*, which I find mixed with our specimens.

"*Var. Americanum*: Tufts small, lax, soft; leaves almost without papillæ, capsule with 8 bands, composed of two series of rectangular cells, feebly differentiated, teeth 8, obtuse perforate along the median line, finely papillose."

I find that Austin was right in citing his 165 as *O. fallax* Sch. (non Sw.) as most of it is that species, and may be readily recognized by its short capsules with abrupt neck immersed in the ochrea, and serrulate leaves. The perforate teeth of *O. Ohioense* gave rise to a manuscript name in Austin's herbarium, *O. perforatum*, which he afterwards published as *O. citrinum*. Sullivant figured *O. Ohioense* with entire teeth.

ORTHOTRICHUM OHIOENSE Sull. & Lesq. Musci Bor. Am. Ed. 2, 181.

Orthotrichum citrinum Aust. Musci App. 170 (1870).

Orthotrichum Ohioense var. *citrinum* (Aust.) L. & J. Man. 171 (1884),

At first sight it would seem desirable to maintain *O. citrinum*

at least as a varietal name, but in carefully examining authentic specimens of Sullivan's and Austin's I found that when they were in their prime, with the capsules mature or just after sporosis, they agreed with *O. Ohioense*; when old and shriveled they agreed with *O. citrinum*. In fact, I found that both were mixed in the same patch, and as in all species of *Orthotrichum* the capsules are very different in different stages, so this seems to be only another instance of the elongation of the neck, and shrinking between the ridges after sporosis. The teeth at first are united in pairs, but later become perforate and then divide. The mouth is bordered by irregular round cells, and the ridges are short, and narrow when the capsule is ripe and inflated, varying from 2-4 rows of cells; the two inner are usually broader and more oblong than the two outer, though all four are usually bright yellow in the mature capsules, and only the two inner turn brown in the old wrinkled capsules. The stomata are very conspicuous in this species, owing to the projection of the cells which surround them and are usually about midway between the base of the spore-sac and the mouth. The calyptra and vaginule are hairy, the ochrea in the mature capsule is longer than the seta and clasps the broad base of the capsule, but with the elongation of the neck and seta it shrinks away.

ORTHOTRICHUM PSILOTHECIUM C. M. & Kindb. Macoun's Cat. 6, 91 (1892).

This species is founded on the slimmest of specimens according to the description, as the authors state that they "have not been able to examine the peristome nor the stomata of the capsule, because only one capsule (in our specimens) is nearly ripe, the others quite unripe."

Now a species of *Orthotrichum* without the stomata described, nor the peristome, is worse than useless, as in this genus the leaves are almost alike in nearly all the species.

We have been favored with a portion of the Rockcliffe specimens by Prof. Macoun, but have not seen the two others cited in the catalogue. The Rockcliffe specimens agree with the description and are still immature as is stated, but we found two old capsules which prove them to be *Orthotrichum strangulatum* Sull. beyond a doubt. The description of the calyptra would indicate

this, but these capsules prove it, for they are constricted below the mouth, with brown ridges and immersed stomata, and reflexed teeth, united in pairs.

ORTHOTRICHUM PUSILLUM Mitt. Journ. Linn. Soc. 8: 25 (1865).

O. psilocarpum James, Trans. Am. Phil. Soc. 13: 110 (1869).

From the remarks in the manual it will be seen that James admitted the above synonymy, but took exception to the capsule being described as 8-plicate when dry, yet in consulting his original description I find the following remarks:

"This species differs from *O. Canadense* by the smooth capsule, although at times it appears striate when empty, the capsular walls are nevertheless equal and not at all different at the apparent striæ, which are produced solely by desiccation."

(The *O. Canadense* referred to is not Schimper's of 1843, but Sullivant's of the Mosses of the U.S., page 33, 1856 = *O. Ohioense*.)

On examining S. & L. Musci bor. Am. 180 I find that the walls of the capsules, though generally smooth when dry, do show faint traces of the differentiation of the walls into ridges, and in fact 3-4 rows of cells are often longer, thicker and narrower, alternating with broad spaces of short quadrangular cells.

The original description by Mitten calls for one of Drummond's mosses from Pennsylvania. I find that Number 82 in his second set (1841) distributed as *O. affine* var. *pumilum* contains specimens of *O. psilocarpum* James, mixed with *O. strangulatum* Sull. The description does not cite any number, but this must be the one referred to, as the locality agrees. Sullivant in the Icones Supplement says:

"Mitten's character of *O. pusillum* 'Theca siccitate 8-plicata' does not agree with this species, in which the capsule is neither plicate nor striate. It represents apparently a different species found intermixed with *O. psilocarpum*. Specimens communicated by the English author, however, truly represent this last species."

Now the explanation of that troublesome quotation is that although Mitten made a mistake in describing the capsule of another species, probably *O. strangulatum*, yet most of his description and his specimens show that he recognized his species as distinct. According to the laws of nomenclature, his name must stand, and the main part of his description, for even his mistake is not a bad one, as the capsules are occasionally faintly 8-ribbed when dry.

In some few cases the outlines of the guard cells are visible in this species; one stoma was seen which appeared superficial, all the rest on the same capsule were immersed. Venturi in the *Muscologia Gallica* says of *O. psilocarpum*, that it is a singular species, which unites the characters and smooth capsule of *O. leiocarpum*, with the section having immersed stomata. In fact it is with *O. striatum* (*O. leiocarpum*) that it is liable to be confounded, but it may readily be distinguished by the absence of the broad erose cilia.

Studies in the Botany of the Southeastern United States—I.

BY JOHN K. SMALL.

(PLATES 170, 171.)

Having taken up the flora of the Southeastern United States as a special field of study in this and the papers to follow, entitled *Studies in the Botany of the Southeastern United States*, I intend to put on record facts concerning the plants of that very interesting region not yet made known, with a view to more extended and connected work when the field has been better explored. The papers will include, for the most part, descriptions of and notes on new species and additions to our flora; also remarks on native and introduced plants, facts concerning geographical and altitudinal distribution, and the relations between the geological formations and certain species. This latter side of botany, much neglected in the past, is exhibited in a striking manner in portions of the Southern States. The sources from which the following contributions are derived are my own collections in the South and the vast amount of material preserved in the Columbia College Herbarium, which includes, besides many types and specimens of the early Southern botanists, the very valuable herbarium of Dr. Chapman, and these sources will be augmented by the collections of local botanists who have promised to coöperate with me.

ASPENIUM BRADLEYI D. C. Eaton, Bull. Torr. Club, 6: 11 (1873).

Contrary to its usual habitat, which is perpendicular or overhanging and rather damp, disintegrating cliffs, *Asplenium Brad-*